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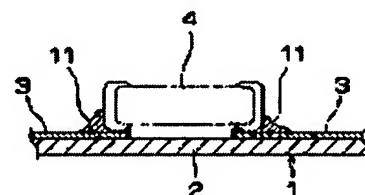
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(54) ELECTRONIC PARTS PACKAGING METHOD

(57)Abstract:

PURPOSE: To enable application of a parts or a board of low thermal resistance, reduce the cost of the parts or the board itself, enable simultaneous packaging of electronic parts such as a liquid crystal display element and an aluminum electrolytic capacitor of essentially low thermal resistance which packaging has been impossible in the conventional technique, and simplify a packaging process.

CONSTITUTION: Thermoplastic resin is used as the material of an insulative board 2. Conductive adhesive agent 11 or anisotropic conductive adhesive agent is used for connecting an electronic parts 4 with a conductor pattern 3. The conductive adhesive agent 11 or the anisotropic conductive adhesive agent is kept at a temperature lower than or equal to the thermal deformation temperature of the thermoplastic resin, and thermoset.



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CLAIMS

[Claim(s)]

[Claim 1] The electronic-parts mounting approach characterized by holding and carrying out heat curing of said electroconductive glue or said different direction electroconductive glue to the temperature of 100-degree less than Centigrade in the electronic-parts mounting approach for carrying the electronic parts of a surface mount method in the printed wired board in which it comes to prepare a conductor pattern on the surface of an insulating substrate, and connecting with it while using electroconductive glue or different direction electroconductive glue for connection with said electronic parts and said conductor pattern.

[Claim 2] The electronic-parts mounting approach characterized by holding and carrying out heat curing of said electroconductive glue or said different direction electroconductive glue to the temperature below the heat deflection temperature of said thermoplastics in the electronic-parts mounting approach for carrying the electronic parts of a surface mount method in the printed wired board in which it comes to prepare a circuit pattern on the surface of an insulating substrate, and connecting with it while using electroconductive glue or different direction electroconductive glue for connection with said electronic parts and said conductor pattern, using thermoplastics as an ingredient of said insulating substrate.

[Claim 3] The electronic-parts mounting approach according to claim 1 or 2 that the resinous principle of said electroconductive glue or different direction electroconductive glue consists of what uses thermosetting resin as a principal component.

[Claim 4] The electronic-parts mounting approach according to claim 1 or 2 characterized by coming to contain low electronic parts of solder thermal resistance, such as a liquid crystal display component or an aluminium electrolytic condenser, as said electronic parts.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the electronic-parts mounting approach for carrying the electronic parts of a surface mount method on the surface of a printed wired board, and connecting.

[0002]

[Description of the Prior Art] Generally the approach of fusing solder and joining from before, as an approach of mounting various kinds of electronic parts, such as a semiconductor IC, in a printed wired board, is used widely.

[0003] However, the components **** (TSMU stone / Manhattan) phenomenon which originates in the surface tension of the fused solder being remarkably large by the surface mount approach using solder, between the circuit terminals by solder ball generation -- which short faulty connection trouble and the formation of a big problem (earth ozone layer depletion) of chlorofluorocarbon use [in / further / residual flux removal washing] -- further Since the soldering method which passes the whole is used for the "furnace" that a surface mount is difficult to heat only a required connection part and generally called a reflow Components and a substrate will be joined by very severe heat, and the severe heat-resistant design is demanded especially of components, therefore the sacrifice on cost and a property has a large thing.

[0004] And this thermal resistance is useless engine performance which it is not required for an essential target, is the thermal resistance in the time of the so-called process (process) required only at the time of soldering, and originally is not needed at all except for the case of being very special, in electronic equipment. Moreover, the actual condition has caused the fall of remarkable productivity -- components which do not essentially have thermal resistance to soldering temperature, such as a liquid crystal display component and an aluminium electrolytic condenser, cannot be mounted in coincidence, but must be post-installed as another process -- and the rise of cost.

[0005] For these reasons, also in the former, the "low-temperature solder" which added the bismuth etc. is examined by the conventional tin-lead system alloy solder, utilization has been carried out to it in part in order to lower the temperature of soldering, and it is about 130-degree Centigrade at most, the temperature has problems, like that a limitation is in low temperature-ization, and the fall of a mechanical strength is still more remarkable, and the solution is not made, either.

[0006] Moreover, although to replace with solder and to use electroconductive glue and different direction electroconductive glue is also tried, in the former, the heating curing temperature of 150-degree about Centigrade is needed at least, the merit of low-temperature-izing is small, and it is not the forge fire which can perform coincidence mounting of an above-mentioned liquid crystal display component, an aluminium electrolytic condenser, etc., therefore there is almost no merit in comparison with low-temperature solder, and practical use has come to be presented.

[0007]

[Problem(s) to be Solved by the Invention] This invention offers the possible mounting approach of the impossible liquid crystal display component, an aluminium electrolytic condenser, etc. making essential coincidence mounting of electronic parts with heat-resistant low temperature possible in the former, and attaining simplification of a mounting process while it enables use of heat-resistant low components or a substrate and aims at the cost fall of components or the substrate itself by reducing the temperature for connection remarkably in view of an above-mentioned problem.

[0008]

[Means for Solving the Problem] The mounting approach concerning invention of claim 1 holds and carries out heat

curing of said electroconductive glue or said different direction electroconductive glue to the temperature of 100-degree less than Centigrade while using electroconductive glue or different direction electroconductive glue for connection with said electronic parts and said conductor pattern in the electronic-parts mounting approach for carrying the electronic parts of a surface mount method in the printed wired board in which it comes to prepare a conductor pattern on the surface of an insulating substrate, and connecting with it in order to solve an above-mentioned technical problem.

[0009] The mounting approach concerning invention of claim 2 holds and carries out heat curing of said electroconductive glue or said different direction electroconductive glue to the temperature below the heat deflection temperature of said thermoplastics while using electroconductive glue or different direction electroconductive glue for connection with said electronic parts and said conductor pattern, using thermoplastics as an ingredient of said insulating substrate.

[0010] As for the mounting approach concerning invention of claim 3, the resinous principle of said electroconductive glue or different direction electroconductive glue uses thermosetting resin as a principal component. By the mounting approach concerning invention of claim 4, low electronic parts of solder thermal resistance, such as a liquid crystal display component or an aluminium electrolytic condenser, are contained as said electronic parts.

[0011]

[Function] In order to connect electronic parts to a printed wired board, electroconductive glue or said different direction electroconductive glue is used, and heat curing of this is held and carried out to the temperature of 100-degree less than Centigrade which is low temperature as compared with the former. Thereby, generating of the thermal damage to electronic parts is prevented.

[0012] Moreover, thermoplastics is used as an ingredient of an insulating substrate. In that case, heat curing of electroconductive glue or said different direction electroconductive glue is held and carried out to temperature lower than the heat deflection temperature of thermoplastics. Thereby, generating of the thermal damage to an insulating substrate and electronic parts is prevented.

[0013]

[Example] Drawing 1 is drawing showing a part of printed circuit unit by the electronic-parts mounting approach concerning this invention. In drawing 1, the printed wired board 1 has the conductor pattern 3 formed in the front face of the insulating substrate 2 made from thermoplastics, and an insulating substrate 2. Since electronic parts 4 are mounted in this printed wired board 1, electroconductive glue 11 is applied to the land of the front face of a conductor pattern 3, electronic parts 4 are laid so that it may be in agreement with a conductor pattern 3, electroconductive glue 11 is stiffened in the condition of having held to temperature lower than the heat deflection temperature of the ingredient used for the insulating substrate 2, i.e., temperature from which an insulating substrate 2 does not start deformation, and electroconductive glue 11 performs immobilization and electrical installation of the electronic parts 4 to a printed wired board 1.

[0014] Here, comparatively cheap general-purpose thermoplastics, such as polystyrene, polyolefine, ABS plastics, an AS resin, PMMA, a polycarbonate, or hard [PVC], can be used as an ingredient of an insulating substrate 2. Since thermal resistance is inferior as compared with thermosetting resin, these thermoplastics is not used as an ingredient of an insulating substrate in the conventional electronic-parts mounting approach which is about Centigrade 150 - 230 degrees and which connects at an elevated temperature comparatively.

[0015] However, it is also possible to use the ingredient used from the former in addition to these thermoplastics, for example, paper phenol resin, a glass epoxy resin, etc., and it is also possible to use the flexible substrate which used polyimide or polyester as the base.

[0016] As an approach of forming a conductor pattern 3, various pattern formation methods which exist from the former, such as an additive process by a subtractive process, nonelectrolytic plating, etc. which use copper clad laminate for a material, can be used.

[0017] Moreover, it is also possible to carry out circuit formation using conductive ink etc., and it is also possible to use the conductive paste wiring film on ceramic substrates, such as ITO wiring film on glass substrates, such as a liquid crystal display component, or an alumina.

[0018] Moreover, it is also possible to use what formed the conductor pattern 3 in the inside side of the sheathing housing with a conductive paste etc. as a printed wired board 1, using sheathing housing of the electronic equipment formed with injection molding of thermoplastics as an insulating substrate 2.

[0019] Although the thing of a surface mount method is suitably used for electronic parts 4, the thing of a pin insertion mounting method can also be loaded together. The thing of a pin insertion mounting method should just be made to perform electrical installation with electroconductive glue 11, after fixing mechanically to a printed wired board 1 using the adhesives for immobilization etc.

[0020] As electronic parts 4, the so-called SOP (small outline package), Semiconductor ICs with a lead, such as QFP (KUWADO flat package) or DIP (dual inline package), The semiconductor IC supplied by the TAB (tape automation TEDDO bonding) method, Or semiconductor integrated circuit components, such as a semiconductor IC supplied as a pair chip like a flip chip, Various electronic parts, such as display devices, such as mechanism elements, such as passive network components, such as semi-conductor components, such as a transistor or diode, a resistor, a capacitor, and a coil, a switch, or a connector, and a liquid crystal display component, can be used.

[0021] Since the temperature to which heat curing of the electroconductive glue 11 is carried out is low like an aluminium electrolytic condenser or a liquid crystal display component among these electronic parts even if it is the electronic parts in which thermal resistance is structurally inferior, generating of a thermal damage like [at the time of using the conventional electronic-parts mounting approach which connects at an elevated temperature comparatively] is prevented, and the merit by this electronic-parts mounting approach is large.

[0022] Electroconductive glue 11 makes resin or a resin constituent distribute a conductive particle, and is made into the shape of the shape of a paste, and a film according to a use gestalt. As a conductive particle, the particle-like powder which carried out metal plating of particles, such as gold, silver, copper, nickel, solder powder, carbon graphite, and tin oxide, and the front face is usable.

[0023] As the resin used for electroconductive glue 11, and a resin constituent, thermosetting resin is desirable, for example, phenol resin, an unsaturated polyester resin, allylic resin, an epoxy resin, silicone resin, acrylic ester resin, etc. are raised.

[0024] Moreover, according to the hardened material nature corresponding to the purpose of use, with thermosetting resin, a curing agent, a hardening accelerator, a cross linking agent, a catalyst, a reaction initiator, etc. examine to these suitably, choose it as them, and are used for them.

[0025] In consideration of the stability at the time of use, beforehand, it is made 2 liquid type with the curing agent etc., using thermosetting resin as base resin, and may be mixed and used at the time of use. Moreover, for physical-properties amelioration, various compounding agents, for example, a viscous grant agent, a softener, a stabilizer, a surface treatment agent, an antioxidant, reaction inhibitor, a coloring agent, a bulking agent, a solvent, a diluent, etc. may be added.

[0026] It considers adhesive and conductive balance, the ratio of a conductive particle and a resinous principle has the desirable range of the conductive particle 50 - the 2500 weight sections to the resinous principle 100 weight section, and its range of the conductive particle 150 - the 900 weight sections is usually much more desirable especially. By this ratio out of range, electric conduction resistance becomes high and becomes disadvantageous practically.

[0027] Although it is necessary to set up low according to the thermal resistance of electronic parts 4, and the ingredient of an insulating substrate 2, when thermoplastics is used for an insulating substrate 2, it is necessary to harden the curing temperature of electroconductive glue 11 at temperature lower than the heat deflection temperature.

[0028] Generally, it is desirable to carry out heat curing of the electroconductive glue 11 at the temperature of 100-degree less than Centigrade from points, such as heat deflection temperature of thermoplastics or thermal resistance, and it is desirable to carry out at the temperature of 80-degree less than Centigrade especially. When heat-curing temperature is high, use of the ingredient for the electronic parts 4 inferior to thermal resistance and an insulating substrate 2 becomes difficult.

[0029] Drawing 2 is drawing showing some other examples of the printed circuit unit by the electronic-parts mounting approach concerning this invention.

[0030] In drawing 2 , it replaces with electroconductive glue 11 and the different direction electroconductive glue 12 is used. By inserting the different direction electroconductive glue 12 between a conductor pattern 3 and the electrode of electronic parts 4, and carrying out heating sticking by pressure of the connection part of an electrode, conductivity is shown in the thickness direction of adhesives, insulation is shown in the direction of a field, and connection between a conductor pattern 3 and electronic parts 4 is made by this.

[0031] The different direction electroconductive glue 12 made the resin or the resin constituent which has high insulation distribute a conductive particle, and is made into the shape of the shape of a paste, and a film according to a

use gestalt. Although the same thing as the case of electroconductive glue 11 can be used as a conductive particle, the particle which carried out metal plating to for example, the plastics particle in addition to it can be used.

[0032] As resin or a resin constituent, the same thing as the case of electroconductive glue 11 is usable. Furthermore, it is possible for a curing agent etc. to be used like the case of electroconductive glue 11, and to also use various compounding agents suitably. Also about curing temperature, it is the same as that of the case of electroconductive glue 11.

[0033] According to the above-mentioned example, heat curing of electroconductive glue 11 or the different direction electroconductive glue 12 can be carried out with temperature lower than before, a printed wired board 1 and the damage by the heat of electronic parts 4 can be prevented by this, and the dependability of the connection in electronic-parts mounting can be maintained.

[0034] Moreover, by making heat-curing temperature into temperature lower than the heat deflection temperature of an insulating substrate 2, general-purpose thermoplastics cheap as an ingredient of an insulating substrate 2 can be used, and the large cost cut of a printed wired board 1 can be aimed at.

[0035]

[Concrete example] Based on the electronic-parts mounting approach of this invention, the printed circuit unit of a digital LCD watch was manufactured.

[0036] (Creation of a styrene substrate) They are epoxy system adhesives (Epicoat 828 made from oil-ized shell epoxy is used as base resin) to the front face of a polystyrene marketing extrusion cast (78 2mm[in electrochemistry HIE-4 thickness] heat-deflection-temperature Centigrade). the product made from oil-ized shell epoxy -- what used EPO mate B-002W as the curing agent, and blended base resin and a curing agent by 2 to 1 -- applying -- electrolytic copper foil (35 micrometers in thickness) -- lamination -- The copper-clad styrene substrate was created by taking out, 24 hours after pressurizing for 2 hours and cooling after that with a press machine in the condition of having heated to 60-degree Centigrade.

[0037] (Creation of a printed wired board) The conductor pattern for digital LCD watches was formed in the front face of the copper-clad styrene substrate which created the photo mask with the pattern for digital LCD watches, and was created previously by the photolithography method of a conventional method, etching processing was performed, and the printed wired board was created by this.

[0038] (Creation of electroconductive glue) Each ** indicated below was blended, mixed stirring was carried out, and electroconductive glue was created.

Epoxy resin Nippon Kayaku RE-304S 20 weight sections Curing agent ACR H-3842 The 1.6 weight sections Shikoku Chemicals Cure ZORU 2MZ The 0.5 weight sections Electric conduction silver dust **** chemistry TCG-7 80 weight sections [0039] In addition, when the created electroconductive glue was stiffened by 60-degree Centigrade for 2 hours and the volume resistivity was measured, 4×10^{-4} ohm and, and cm were shown.

[0040] (Electronic parts) MSM5055L-18 which are a commercial semiconductor IC (QFP), MSM 6243-02, MSC1161, a stacked type ceramic condenser, etc. were used. Moreover, the liquid crystal display component and the switch converted and used the thing of a commercial pin insertion mounting method for the surface mount method.

[0041] (Creation of a printed circuit unit) After applying electroconductive glue by screen-stencil on the conductor pattern of a printed wired board (on a land), all electronic parts were laid and this was put in in oven, it heated by 60-degree Centigrade for 2 hours, and heat curing of the electroconductive glue was carried out, and it was taken out after that.

[0042] When the predetermined power source was connected to the created digital LCD watch, all functions, such as a time stamp function and a voice output function, operated normally.

[0043] (Example of a comparison of printed circuit unit creation) In the creation process of an above-mentioned printed circuit unit, heating temperature within oven was made into 90-degree Centigrade (2 hours), the digital LCD watch for a comparison was created, and when it took out from oven and having been observed, the printed wired board had caused deformation remarkably.

[0044]

[Effect of the Invention] While according to this invention becoming usable [heat-resistant low components or a substrate] and achieving a cost fall, in the former, coincidence mounting of heat-resistant low electronic parts is essentially [the impossible liquid crystal display component, an aluminium electrolytic condenser, etc.] attained.

[0045] According to invention of claim 2, the cheap thermoplastics which was excellent in various electrical

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characteristics, such as a RF property, as an ingredient of an insulating substrate can be used.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing a part of printed circuit unit by the electronic-parts mounting approach concerning this invention.

[Drawing 2] It is drawing showing some other examples of the printed circuit unit by the electronic-parts mounting approach concerning this invention.

[Description of Notations]

1 Printed Wired Board

2 Insulating Substrate

3 Conductor Pattern

4 Electronic Parts

11 Electroconductive Glue

12 Different Direction Electroconductive Glue

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